THE SPANISH PENSION SYSTEM: ISSUES OF INTRODUCING NOTIONAL DEFINED CONTRIBUTION ACCOUNTS♦.

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ABSTRACT
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There are two aims to this paper: firstly, to provide an objective technical assessment of the current situation of the contributory pension system in Spain and its prospects for the future, and secondly, to look at the issues surrounding the introduction of a system of notional defined contribution accounts. To this end we explain the basic elements upon which the current system is based and show its main indicators, then set out some of its fundamental problems. Following this we look at the most relevant research work, where forecasts can be found that will give us a clear idea of the system's financial sustainability. Finally we put forward an argument as to why a notional accounts system could be a valid alternative for reforming the current system, and suggest which formula or group of formulas would best fit the profile of contributor-beneficiary risk and what the transition process would be.
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KEYWORDS: Retirement, Pay-as-you-go, Internal Rate of Return (IRR), Financial sustainability.

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I.-INTRODUCTION

The race to reform pension systems in many countries over the last few years has been such that, as Valdés (2002) points out, the problems of pension reform have begun to dominate economic policy.

The main reforms proposed and applied can be summarized as parametric reforms of the pay-as-you-go (PAYG) system, changes to other (mainly capitalization) systems, and systems combining funded system and PAYG, as proposed chiefly by the World Bank. Reform trends championed by the main international organizations can be found in papers by Gillion (2000), Holzmann (2000) and Queisser (2000).

One of the most important recent innovations in pension reform has been the introduction of so-called "notional defined contribution accounts" in some countries, namely Brazil[3] (1999), Italy (1995), Latvia (1996), Mongolia (2000), The Kyrgyz Republic (1997)[4], Poland (1999) and Sweden (1999). According to Williamson (2004), other countries such as China and Russia are also seriously thinking about introducing them.

The European Union, the World Bank and the OECD, along with various Spanish researchers such as Alonso & Herce (2003), Barea & Gónzalez-Páramo (1996), Bonin et al. (2001), Devesa et al. (2000 & 2002), Durán & López-García (1996), Gil & Patxot (2002), Herce (1997 & 2001), Herce & Pérez (1995), Herce & Alonso (2000a & 2000b), Jimeno (2003, 2002 & 2000) Jimeno & Licandro (1999), Mateo (1997), Meneu (1998), Montero (2000), and Piñera & Weinstein (1996), have all strongly recommended an in-depth revision of the Spanish public pension system. All are agreed that, at least in the long term, the financial viability of the system is seriously at risk. One valid possibility could be the introduction of notional accounts, as first suggested by Mateo (1997) and taken up in more detail by Devesa & Vidal (2004) and Vidal et al. (2004) and (2005).

In this paper we will provide an objective technical assessment of the current situation of the contributory pension system in Spain and its prospects for the future. We will then look into the possibility of introducing a system of notional defined contribution accounts. To this end, the structure of the paper is as follows: after this introduction, in Section II we explain the basic elements upon which the current system is based and show its main indicators; in Section III we set out its fundamental problems and look at the most relevant research work, the conclusions of which will give us a clear idea of the system's financial sustainability; Section IV includes a number of reasons as to why a notional accounts system could be a valid alternative for reforming the current system; in Section V we discuss which formula or group of formulas would best fit the profile of contributor-beneficiary risk and what the transition process would be; and finally we present our conclusions.

II.-THE PUBLIC PENSION SYSTEM IN SPAIN

In this section we show the main features of the Spanish Social Security system and supply some key data. The system provides the following types of protection:

a) Contributory social insurance programs, organized along occupational lines, which awards benefits to compensate for revenue no longer earned due to sickness, accident,

[3] This is not exactly a notional accounts system.

[4] The Kyrgyz Republic's scheme, Palmer (2005), is incompletely designed regarding the rate of return, although the long transition period will allow plenty of time to improve the system design.

unemployment, family responsibilities, disability, old age and death. The amount payable depends on how much has been contributed over how long. This type of protection is financed by contributions from employees and/or employers, and is run by the state.

b) Non-contributory protection, the purpose of which is to provide financial cover for disability, old age, unemployment and family responsibilities. The amount payable is the same for everyone and conditional upon the beneficiary's lack of resources. This type of protection is financed and run by the state through taxation.

c) A universal benefit, basically healthcare and social services, open to everyone and financed at present through a mixed system of social security contributions and money from the state. There are plans to finance it in future through general revenues alone.

d) Alongside the previous types of state-run protection there also exists a complementary system of privately-run protection. Its most visible forms are friendly societies, group life insurance, and pension plans and funds.

This paper will concentrate mainly on type a). The contributory system is structured in different "regimes" or systems, each of which covers a group of workers of a particular type. These special systems, as will be seen later on, cause a great many problems. At present the following systems exist:

a) General System. This is the essential nucleus of the system as a whole and includes all employees over 16 not included in another "special system". It accounts for 60% of pensions and 75% of contributors. Its spending on pensions was 6.49% of GDP in 2003. This regime has a surplus of 1.08% of GDP.

b) Special System for the Self-employed. This includes everyone who works for themselves or is not dependent on an employer (apart from those covered by the Special Systems for Agricultural or Fisheries Workers). It accounts for 17% of contributors and pays out around 13% of pensions. Its spending on pensions was 0.84% of GDP in 2003. This regime has a surplus of 0.25% of GDP.

c) Special System for Agricultural Workers. This includes all those who normally work in agriculture, forestry or with livestock. It covers those who are employed by someone else as well as those who have their own smallholdings. It accounts for 21% of pensions and 7% of contributors. Its spending on pensions was 1.31% of GDP in 2003. This regime has a huge deficit of 1.12% of GDP.

d) Special System for Fisheries Workers. This includes all employed and self-employed workers involved in fisheries activities on land and at sea. It accounts for 1.8% of pensions and 0.46% of contributors. This regime has a deficit of 0.15% of GDP.

e) Special System for Coalmining. This applies to all those employed to work in coal mines. It accounts for just 0.1% of contributors but pays 1% of pensions. This regime has a deficit of 0.13% of GDP.

f) Special System for Domestic Staff. This covers those who provide exclusively domestic services for one or more heads of family. The services must be provided in the house where the head of family lives, and a wage or payment must be received in exchange. This regime accounts for 1.14% of contributors and pays out 2.8% of pensions. It has a deficit of 0.13% of GDP.

g) Apart from the special systems mentioned above, there are others covering civil servants, the armed forces and the judiciary. The most important of these is the one for civil servants.

Coordination between the General and the various Special Systems is assured because the system is based on the following principles: i.) a common legal basis for the system as a whole; ii.) unique one-off registration details regardless of transfers between systems; and iii.) reciprocal calculation of quotas between the partial systems that make up the system as a whole.

The most relevant rules for determining the amount of retirement pension are:

1) The pension base is calculated according to contributions made during the last 15 years of work. Contributions for the 24 months immediately prior to retirement are taken at nominal value, while previous contribution rates are revalued in line with the Retail Price Index (RPI) for the months up to and including the 25th month before retirement. From this date begins the period of contribution rates taken at nominal value.

2) In the case of the General System, the pension is determined by applying the corresponding replacement rate to the pension base. This is variable according to the number of years contributed. A sliding scale is applied starting at 50% after 15 years contributions, rising by 3% for every additional year from the sixteenth to the twenty-fifth, and by 2% from the twenty-sixth year up to a maximum of 100% for 35 years. When retirement pension is first claimed after age 65, a rate of 100% is applied plus an additional 2% for every full year contributed after that age, always assuming that 35 years contributions have already been paid. The minimum retirement age is 60 years.

3) The replacement rate is reduced by between 6% and 8% for each year the retirement age is brought forward from the legal retirement age of 65.

4) The pension increases annually in line with the RPI.

Table 1: Ratio between number of contributors to number of contributory pensions

Year	General [5]	Self-employed	Agricultural Workers	Coalmining	Fisheries	Domestic Staff	Total
1980	3.39	3.84	1.22	0.84	1.67	4.13	2.46
1985	2.81	3.11	1.04	0.74	1.40	2.29	2.11
1993	2.65	3.10	0.74	0.44	0.96	0.86	1.83
1994	2.46	3.08	0.72	0.41	0.89	0.78	1.77
1995	2.44	3.07	0.71	0.38	0.73	0.73	1.77
1996	2.39	3.03	0.71	0.36	0.68	0.71	1.76
1997	2.40	2.99	0.72	0.34	0.65	0.70	1.78
1998	2.47	2.99	0.72	0.28	0.63	0.69	1.83
1999	2.58	3.01	0.73	0.26	0.62	0.72	1.91
2000	2.69	3.00	0.72	0.24	0.62	0.74	1.98
2001	2.77	2.97	0.72	0.22	0.61	0.76	2.04
2002	2.82	2.94	0.73	0.20	0.59	0.87	2.08
2003	2.85	2.93	0.75	0.19	0.58	0.93	2.12

Source: "La Seguridad Social en el umbral del siglo XXI" for 1980 and 1985, with the rest compiled from http://www.mtas.es

[5] The ratio between contributors and number of pensions is not strictly comparable for the last few years - from 1990 onwards - as there has been a change in the way the data is broken down to calculate it.

Table 1 can be used to analyze the evolution of one of the most significant variables for understanding the main problem faced by the Spanish pension system: the ratio between the number of contributors and the number of pensions. As far as the totals are concerned, a downward trend can be seen up to 1996, but from then on they begin to increase. These variations are similar to those within the General System (it should not be forgotten that this is the system with the greatest relative weight) and the Special System for Domestic Workers (although the upward trend in this system began later), but unlike those in the other systems, where the trend is still downwards. The recovery of the General System is due to a much higher rate of growth in the number of contributors than in the number of pensions. Nevertheless, the figures still give cause for concern.

III.-FUTURE PERSPECTIVES FOR THE SPANISH PENSION SYSTEM

After a brief description of the main features of the public pension system in Spain, we analyze its future perspectives from the point of view of politicians, social agents, public opinion and experts, and then discuss its main problems and some of the measures put forward for solving them.

At the beginning of the 90s, as Jimeno (2002) explains, the effects of the economic recession on the public budget and the need to carry out a certain amount of fiscal consolidation imposed by the requirements of the Treaty of Maastricht meant that "anxiety" over the pensions problem became more acute and much research was carried out as to the system's financial viability. In the papers published, which relied basically on simulation models, there is an almost general consensus that the current pension system would suffer serious problems in the short term if steps were not taken to correct the deviations that would come about mainly due to the ageing of the population. Another problem is that the system does not offer good labor incentives[6].

Public opinion has been very concerned about the political use of the pension problem as an electoral weapon. According to Pérez-Díaz et al. (1997), there was growing awareness that there was a problem with pensions, even a gradual conviction that reforms were necessary and that the system in its current form could not go on indefinitely. As Alvira et al. (1996) noted, a great many people were worried about the future of their retirement revenue, and the public welfare system was seen in a negative light. Only those who had already retired had a positive opinion about the public system. During the economic expansion of the last few years there has been massive job creation and record numbers of affiliates on the registers. This has lifted much of the pressure off the public purse and has meant that the "pension problem" has shifted to a secondary level.

The Spanish government only admits the possibility of carrying out parametric type reforms in the sense described by Holzmann et al. (2003). At present there is an atmosphere of unbridled joy because for the first time ever the reserve fund amounts to approximately 1.43% of GDP, with record numbers of contributors on the books. According to official sources, there are three measures considered essential for safeguarding the financial sustainability of the system:

[6] This problem is not dealt with here. There is a great deal of literature on the (dis)incentives of the jobs market generated by the current pension system. On this subject see Boldrin, Dolado, Jimeno & Peracchi (1999), Boldrin et al. (1999, 2000a, & 2000b), Diamond (2001), Jiménez-Martín & Sánchez (2000 & 2001) & Jimeno (2000).

1) The reference period for calculating the amount of pensions should be extended to cover the entire working life.

2) The money needed to cover the shortfall in some pensions and bring them up to minimum levels should be provided through general taxation[7]. In other words, this explicit redistribution should be carried out through the non-contributory system since it is still paid for with the surplus from contributions, around 4,132 million euros in 2003, i.e. 0.63% of GDP 30% of pensions are minimum rate.

3) There has to be a reduction in the avalanche of early retirements, which are preventing the real retirement age from being raised.

We will be looking at a number of papers in which some very different methodologies are used to "prove" that the pension problem in Spain really is important despite the fact that the current government, like the previous ones, and the trade unions deny the size of the problem. This is because pension system reform is tremendously unpopular and the effects are only visible in the long term, far beyond the planning horizon of the government and trade unions, both of which tend to concentrate on the short term.

The questions analyzed are the following:

1) Demographic projections.
2) Implicit debt.
3) Intragenerational fairness.
4) The financial solvency of the system.

1) Demographic projections

According to Jimeno (2002), the general features of population ageing in Spain are:

- Increased life expectancy - it has risen by more than 9 years, from 69.85 years in 1960 to 79.08 in 2000 - will bring about an increase in the number of people over 65 as a proportion of the total population.

- The decrease in birthrate, which in Spain has taken place later but with greater intensity and speed than in other countries, will also contribute to reducing the relative weight of the working age population over the next 50 years.

- Immigration, which over the last five years has risen at an unprecedented rate in Spain, could mitigate the reduction in working age population.

Although it is uncertain how these demographic variables might develop in the future, it appears inevitable that the ratio between the sizes of older and younger cohorts will increase noticeably during the first half of this century, even under the most optimistic scenarios. In this respect, the projections of the National Institute of Statistics (Instituto Nacional de Estadística, INE) (2001), which are shown in Table 2 in revised form so as to incorporate recent changes in mortality, birthrates and immigration in the second half of the 90s, imply that the ratio between the population over 65 and the population between 20 and 64 will increase from 27% in 2001 up to 36% in 2025, reaching approximately 60% in 2050.

[7] The amount added to the pension if it is less than the minimum pension guaranteed under the general system.

Table 2: Population projections for Spain 2002-2050 based on the 2001 census by the National Institute of Statistics					
Year	**Immigrants (a)**	**Average number of children**	**Life expectancy at birth**		**Population at 31 December (in millions)**
			Women	**Men**	
2002	227,000	1.279	83.07	75.72	40.683
2003	204,000	1.308	83.27	75.83	40.935
2004	181,000	1.327	83.39	75.94	41.167
2005	160,000	1.361	83.55	76.05	41.379
2010	160,000	1.424	84.35	76.58	42.359
2020	160,000	1.424	85.10	77.27	43.378
2030	160,000	1.424	85.10	77.65	43.369
2040	160,000	1.424	85.10	77.65	42.744
2050	160,000	1.424	85.10	77.65	41.200
Hypothesis I or central scenario **Source: www.ine.es**					

Montero (2000) analyzes the effects the progressive ageing of the population will have on financing Social Security in Spain. She confirms that, if current contribution rates remain constant, the government will not be able to guarantee future retirees current levels of pensions. For this to be achieved, the contribution rate will have to be increased by 10 points, up to 36.4%. According to the author, increasing the age of retirement[8] will enable current pension levels to be maintained without having to increase contribution rates.

2) Implicit debt

Bonin et al. (2001) estimate the implicit debt[9] built up by the current pension system in 1996 at 175.7% of the GDP for that year. As a continuation of the work done in that paper, Gil & Patxot (2002) explore the possibility of introducing reform policies on the revenue side so as to lessen the strong demographic dependence of Social Security revenue. They conclude that the severity of the demographic crisis makes this type of measure clearly insufficient for restoring the intergenerational equilibrium and that if the current configuration of the pension system is maintained indefinitely, this will be likely to transfer to future generations a volume of debt that would vary between 167% and 206% of the GDP for 1996. To overcome this gap in sustainability, revenue would need to be increased by between 3.97% and 4.89% of GDP every year.

The above calculation is an underestimate for two main reasons:

1.-Early retirement is considered to be eliminated.

2.-It does not take into account the Special System for Civil Servants.

Redecillas (1996) estimates the implicit debt at 31 December 1994 at 2.1 times the GDP, excluding the Special System for Civil Servants (another 0.3 times the GDP), while Abio et al. (1999) estimate it at twice the GDP for 1996. This debt grows sharply over time. According to Redecillas (1996), the pension rights of the Social Security (pensioners) grew

[8] As shown by Boldrin et al. (1999), much of the increase in spending on pensions that came about in many EU countries during the last quarter of the twentieth century was due to lowering the effective age of retirement.

[9] Accrued-to-date liabilities: These represent the present value of pensions to be paid in the future on the basis of accrued rights; neither the future contributions nor the accrual of the new rights they imply are considered. For the terminology on pension liabilities, see Holzmann (1998).

from 0.9 times GDP in 1989 to 1.04 times five years later, at the rate of almost 3 percentage points of GDP per year.

3) Intragenerational fairness

Another aspect to be taken into account in a contributory pension system is intragenerational fairness, which should be understood to mean that all members of the same generation should be able to obtain a similar return on contributions paid, independently of the sector in which they were employed. In this case the way the Social Security system in Spain is divided into a series of special systems leads to differences in the way individuals of the same generation are treated. Monasterio et al. (1996) analyze the different options used by contributors to maximize their revenue and 'beat the system'. So far, in June 2004, no legislation has yet been passed to counteract most of the problems described.

On this subject, Bandrés & Cuenca (1998) examine to what extent the modifications adopted regarding retirement pensions achieve one of the aims declared in the 1997 legislation (the most important pensions legislation of recent years): the strengthening of the system's fairness.

To do this they analyze the amount of variation between the pensions payable to and the contributions paid by pensioners retiring under the terms of the 1997 law. The quantification is done mainly by using the transfer component, which is defined as that part of the pension received which exceeds the amount of a pension maintaining actuarial equilibrium between contributions and pension, and which, therefore, can be interpreted as a transfer. This enables the entire intergenerational transfer that new pensioners receive to be quantified, as well as the different intragenerational transfers by the Social Security system. An empirical study is carried out on the cohort of pensioners who started to receive pensions in 1993. The results appear in Tables 3 and 4.

Table 3: Transfer components and Real Internal Rate of Return (IRR). Law 26/1985 (by system as a percentage of total pensions paid)

System	Initial neutral pension	Total Transfer	Transfer component		IRR (real)
			Transfer to initial pension	Minimum complement	
General	79.49	20.51	18.25	2.26	3.86
Self-employed	48.48	51.52	38.48	12.88	8.76
Agricultural workers (employed)	36.36	63.64	55.15	8.49	8.93
Agricultural workers (self-employed)	31.76	68.24	55.90	12.34	10.58
Domestic staff	24.54	75.46	50.08	25.39	16.10
Total	71.45	28.55	24.13	4.42	4.70

Source: Bandrés & Cuenca (1998).

The retirement pension reforms approved in 1997 would reduce the transfer component from 28.55% of total pensions under 1985 legislation to 21.65% if the new method of calculation were applied simultaneously.

The repercussions on the various separate systems are very different: while the special systems appear to be almost unaffected by the new regulations, the transfer component of the General System would be reduced from 20.51% to 11.55%, which means we can assume that

this is the system the reform was aimed at. A reduction in the rate of return can also be seen for the different systems, although the greatest reduction comes about in the General System.

Table 4: Transfer components and Real Internal Rate of Return (IRR). Law 24/1997 (by system as a percentage of the total pensions paid)					
System	**Initial neutral pension**	**Total transfer**	**Transfer component**		
			Transfer to initial pension	**Minimum complement**	**IRR (real)**
General	88.45	11.55	7.55	4.00	3.15
Self-employed	50.37	49.63	28.01	21.62	8.44
Agricultural workers (employed)	37.51	62.49	46.69	15.80	8.75
Agricultural workers (self-employed)	32.82	67.18	46.30	20.88	10.36
Domestic staff	25.39	74.61	35.97	38.64	15.79
Total	78.35	21.65	13.86	7.79	4.06
Source: Bandrés & Cuenca (1998).					

4) Financial (actuarial) solvency of the system

Another way of focusing on the problem of pension systems is based on work carried out by Samuelson (1958) and Aaron (1966), which is still completely valid and widely quoted in the literature: a pension system financed by PAYG or through intergenerational transfers will only be viable in the long term if its internal rate of return (IRR) does not exceed the growth rate of earnings plus the stable growth rate of the contributing population, i.e. if it does not exceed the growth of the system's tax base. Therefore the financial viability of the PAYG system will be linked to average economic growth sustainable in the long term, and this in turn will be the benchmark for setting the sustainability of the system. Devesa et al. (2000 & 2002) calculate the real IRR of the General System. The average value of the IRR - around 4.25% for retirement ages close to the legal age - is much higher than the average GDP over the last 30 years (1970-2000), an annual accumulative rate of around 3%. It can be concluded that, should average economic growth not reach a certain level, the current configuration of the retirement pension system in Spain is not sustainable in the Samuelson-Aaron sense.

Jimeno (2002), bringing a previous work up to date (Jimeno (2000)), also arrives at similar conclusions using a simple formula to analyze the components of pension costs. The paper forecasts pension costs in relation to GDP in 2025 and 2050 based on certain assumptions regarding the future evolution of the four factors shown.

These forecasts are represented in three scenarios, two of which determine the percentage of spending in relation to GDP and one which determines what the percentage ratio between average pension and average output should be to enable a certain level of spending on pensions in relation to GDP to be maintained. The results are shown in Table 5 and lead us to conclude that maintaining spending on pensions in relation to GDP at acceptable levels, even in the most favorable scenario, would require the regulations governing the way pensions are calculated to be reformed. At the same time they also show that there is an urgent need to set up alternative ways of financing pension costs, although, as the author points out, resorting to alternative sources of finance (general revenues, for example) is not exempt from problems, since a significant increase in the weight of general taxation in financing pension costs would substantially alter the essence of the Social Security contributory programs by breaking the existing link between contributions and benefits.

Table 5: Forecast spending on pensions for 2025 and 2050			
2001			
Population between 20-64 (in millions)	25.2		
Population over 65 (in millions)	6.9		
Number of pensions (in millions)	7.7		
Employment (in millions)	16.0		
Pensions/Population over 65	**1.12**		
Population over 65/Population between 20-64 (%)	**27.4**		
Rate of employment (%)	**63.5**		
Average pension/Average output (%)	**17.1**		
Spending on pensions/GDP (%)	8.3		
2025			
Population between 20-64 (in millions)	26.0	26.0	26.0
Population over 65 (in millions)	9.4	9.4	9.4
Number of pensions (in millions)	10.5	10.8	10.8
Employment (in millions)	16.9	18.2	19.2
Pensions/Population over 65	**1.12**	**1.15**	**1.15**
Population over 65/Population between 20-64 (%)	**36.2**	**36.2**	**36.2**
Rate of employment (%)	**65**	**70**	**70**
Average pension/Average output (%)	**17**	**20**	20.2
Spending on pensions/GDP (%)	10.6	11.9	**12**
2050			
Population between 20-64 (in millions)	23.3	23.3	23.3
Population over 65 (in millions)	12.8	12.8	12.8
Number of pensions (in millions)	14.3	14.7	14.7
Employment (in millions)	15.1	16.3	17.2
Pensions/Population over 65	**1.12**	**1.15**	**1.15**
Population over 65/Population between 20-64 (%)	**60**	**60**	**60**
Rate of employment (%)	**65**	**70**	**70**
Average pension/Average output (%)	**17**	**20**	12.2
Spending on pensions/GDP (%)	17.6	19.7	**12**
Source: Jimeno (2002)			

The last paper analyzed is by Alonso & Herce (2003), in which they continue, expand, correct and modify their previous papers[10]. Recent population forecasts have been drawn up by the National Institute of Statistics for a horizon of 2050 taking into account scenarios which include immigration, something which up to now has not been considered in Spain. They analyze the consequences of immigration on forecasts for costs and revenue for the Spanish contributory pension system by establishing a central projection and then analyzing its sensitivity to different hypotheses regarding immigration, growth in output and different ways of calculating the pension base.

The work is developed using the MODPENS (Modelo de Pensiones) model (similar to the PROST model) by FEDEA[11]. The basis for this paper are the demographic and macroeconomic scenarios in which the hypotheses are established - the former already described in comments about the paper by Jimeno (2002). MODPENS is an accounting model which does not consider behavior reactions. Nevertheless, apart from this limitation the model

[10] See especially the papers by Herce & Alonso (2000a & 2000b), Herce (2000) & Herce & Pérez-Díaz (1995). The authors consider it natural that exercises in projections should be repeated at regular intervals to take into account new economic and demographic circumstances, changes in legislation, improvements in methodology and the need to explore new hypotheses.

11 FEDEA (Fundación de Economía Aplicada) is a private, non-profit making institution that obtains part of its operating resources from a capital fund set up by its sponsors. Its objective is to carry out studies that contribute to the analysis, diagnosis and discussion of Spanish economic problems, applying the principles of economic analysis and using rigorous scientific methods and independent judgement.

is useful because of the information it supplies about the different systems and numbers of affiliates and pensioners by age and sex.

Table 6: Projections for the Spanish contributory pension system 2003-2050. Central scenario.												
	2003	**2004**	**2005**	**2010**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**	**2050**
Affiliated workers[12]	16,448	16,777	17,113	18,333	19,146	19,416	19,303	18,870	18,115	17,133	16,240	15,767
Unemployed[13]	657	615	568	365	282	286	284	278	266	252	239	232
Number of pensions[14]	7,894	7,998	8,098	8,164	8,584	9,176	9,955	10,830	11,712	12,432	12,856	12,761
Ratio affiliates/pensioners	2.08	2.10	2.11	2.25	2.23	2.12	1.94	1.74	1.55	1.38	1.26	1.24
Income from contributions[15]	10.67	10.65	10.62	10.53	10.50	10.50	10.50	10.50	10.49	10.48	10.47	10.46
Spending on pensions[16]	9.75	9.75	9.74	9.33	9.71	10.40	11.42	12.71	14.29	15.87	17.12	17.23
Surplus or deficit	0.92	0.90	0.89	1.21	0.79	0.10	-0.92	-2.21	-3.80	-5.39	-6.65	-6.77
Accumulated fund or debt[17]	1.43	2.33	3.23	8.67	14.04	16.82	15.53	8.18	-7.26	-32.72	-68.46	-109.1
Source: Alonso & Herce (2003) and own.												

Conditional upon the assumptions being fulfilled, the results shown in Table 6 suggest that, despite the census of the immigrant population implied by the most optimistic assumptions, long-term spending on pensions will continue to be appreciably greater than revenue from contributions, although in the short and medium term the amount of money in the system may show a marked increase. Naturally, the greater the migratory fluxes are, the smaller the financial insufficiency will be and the later it will appear. Similarly a rapid advance in output will defer the time and size of the system's financial insufficiency because pensions cannot capture output gains in the same proportion as salaries can, which would imply the relative impoverishment of pensioners. Job creation will sooner or later run up against a lack of manpower despite the steady influx of immigrants, and immigration cannot be depended upon for the system's long-term financial sufficiency even though it may have been its mainstay in the recent past. Finally, increasing the period for calculating the pension base of the pension has appreciable effects depending on the number of years taken into account. Faced with a problematic long-term central scenario, extreme scenarios as good or bad as desired can be considered, but they will be even more improbable.

All the papers analyzed have highlighted that:

- The current configuration of the pension system is not the best possible.
- Financial solvency cannot be achieved with the current system.
- The current system is not actuarially fair.

[12] Annual average in thousands.
[13] Annual average in thousands. The Department of Employment (Instituto Nacional de Empleo, INEM) makes contributions for them to Social Security at the minimum contribution rate.
[14] At the end of year, in thousands. Currently there are around 1.1 pensions to each pensioner.
[15] As a percentage of GDP, including contributions for temporary incapacity.
[16] As a percentage of GDP, including benefits for temporary incapacity, industrial injury, industrial disease and administration costs.
[17] The surplus for each year is added to that of the year before or the deficit subtracted. Returns on the fund or interest on debt are included in each case. The real interest rate is assumed to be 3%. This amount is not the implicit debt, which would clearly be far higher.

The situation described in this section caused radical reforms to be proposed following the philosophy that big problems need big solutions. The reforms concentrated on the progressive abandonment of the PAYG system and a move towards a funded system. The idea behind them was that pensions would be guaranteed with a larger amount than in the current system and, in addition to this, it would stimulate savings and economic growth. Bailén & Gil (1996) and Piñera & Weinstein (1996) were the first to propose these reforms. According to them, changing the system would take away the commitment to pay pensions from the State's accounts, would provide better individual pensions at a lower cost than the current system, and increase personal saving, the accumulation of private capital and economic growth.

Another proposal was put forward by Herce et al. (1996). They defend the argument that the transition to a mixed system is not only possible but desirable because it would enable those workers who wanted to partially withdraw from the PAYG system and deposit part of their contributions in a private pension fund to do so in such a way that, on retirement, they would receive an revenue made up of the sum of both pensions. According to the authors, the advantage of their system compared to one of total substitution is based on the fact that, on the one hand, there would be less coercion towards participants since no worker would lose the option of remaining within the Social Security system, and on the other hand, the transition from the current PAYG model to the mixed model would be easier to finance given that the reduction in monies entering the public system would not be extremely high because no worker would stop making contributions to Social Security.

Along similar lines, Herce (2001) again proposes that the partial privatization of public pensions could bring net advantages for future pensioners, and so radical reform of the pension system should be undertaken as soon as possible. However, he makes no definite proposal as to how the transition should be made.

The reform proposals above have been rejected for five main reasons:

1) They meet with the unanimous opposition of all political parties and trade unions.

2) It would not be easy to take on the transition costs due to the enormous implicit debt accumulated.

3) Maintaining the current market (complementary system) and commission structure would mean high administration costs for contributors, see Devesa et al. (2002a, 2002b & 2003),

4) The bad experiences associated with the real returns achieved by the private pension plan system over the last few years have made the Spanish population generally skeptical about the functioning of capital markets.

5) As mentioned before, there has been massive job creation and record numbers of affiliates on the registers over the last few years, and this has meant that the “pension problem” has shifted to a secondary level.

IV.-ISSUES SURROUNDING THE INTRODUCTION OF A SYSTEM OF NOTIONAL DEFINED CONTRIBUTION ACCOUNTS

As described in the previous section, various proposals for reforming the pension system have been put forward and rejected in recent years. The aim of this section is to measure the effect that pension formulas based on notional account philosophy would have had on the initial

amount of retirement pension and on the system's internal rate of return if they had been introduced in Spain.

The first paper to truly link the Spanish contributory pension system with notional accounts is the one by Devesa & Vidal (2004). They simulate the effect that would have been brought about by the introduction of regulations similar to those applying to the first and/or second pillar in the reformed pension systems of Brazil, Italy, Latvia, Poland and Sweden. The simulation uses data for Spain for the following variables as benchmarks for calculating the pension: variation in the RPI, variation in average earnings (AEI), variation in the nominal GDP, and the total Social Security contributions index (TSSCI). The evolution of the variables used for this calculation can be seen in Graph 1. A great degree of volatility can be seen over the years, with the highest values being reached in the mid-70s.

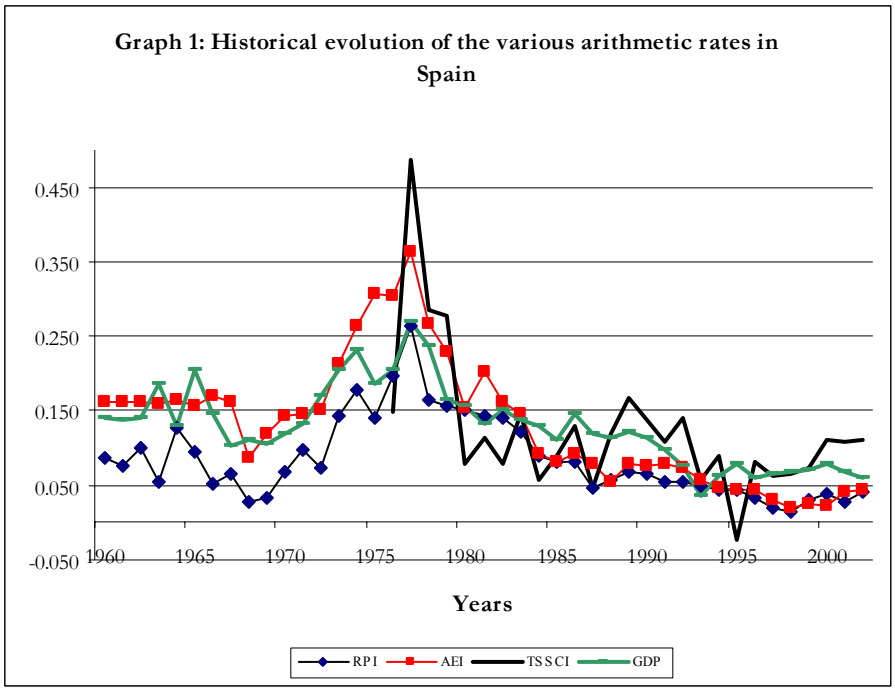

Table 7: Ratio between the initial pension in Spain (current system) and the initial pension using calculation rules from notional formulas applied in other countries.					
Years contributed (YC)	**SWEDEN**	**ITALY**	**BRAZIL**	**POLAND**	**LATVIA**
15	2.49	2.83	2.23	4.09	2.77
20	2.43	2.48	2.22	4.14	2.51
25	2.39	2.27	2.25	4.30	2.47
30	2.24	2.14	2.26	4.32	2.31
35	2.11	2.08	2.30	4.37	2.19
40	1.85	1.86	2.19	4.09	1.93
Source: Devesa & Vidal (2004) **NB: Retirement age 65 and last salary equal to 100% of maximum pensionable earnings for 2002.**					

Table 7 shows the ratio between the initial pension in Spain and the initial pensions that would have been provided by retirement formulas based on notional defined contribution accounts as an approximation of the rules for calculating applied in Sweden, Italy, Brazil, Poland and Latvia.

The value underlined in Table 7 indicates that a person in Spain who retires at age 65 after contributing for 25 years obtains an initial pension 2.25 times greater than would have been obtained under Brazilian regulations. As can be seen, the ratio between the pension calculated according to rules in force in Spain in 2003 and the pension calculated with the data for Spain but using the calculation rules from countries with notional account systems does not fluctuate much according to the number of years contributed.

The fact that pensions are indexed according to different variables and different coefficients makes the initial pension an unsuitable element for comparison, and therefore "forces" comparisons to be made with reference to the IRR (see Table 8 for data on the IRR). Its value, calculated according to the rules in force in Spain for 2003, is much higher than the other values obtained by applying the rules from other countries except in the case of 10 years contributions. This is because, according to those rules, pension entitlement in Spain only starts after 15 years contributions. The highest IRR in Spain is for 15 years contributions, and it decreases from then on. The real IRR for women is always higher than for men because the amount of pension is the same but the probability of survival after retirement age (used for calculating the real IRR) is greater. It is also useful to note that under no set of rules does the IRR exceed 3.6%. This is the value of the average growth of GDP in Spain over the last 40 years and connects with the maximum value that should be shown by the IRR of a PAYG pension system for it to be sustainable in the Samuelson sense.

Table 8: IRR according to number of years contributed. Men (women).

Years contributed (YC)	SPAIN	SWEDEN	ITALY	BRAZIL	POLAND	LATVIA
10	- ∞ (- ∞)	2.09 (3.33)	0.61 (1.91)	3.01 (4.22)	-0.45 (0.93)	0.96 (2.26)
15	7.75 (8.58)	1.91 (2.97)	1.15 (2.24)	2.57 (3.61)	-0.44 (0.76)	1.44 (2.54)
20	6.54 (7.27)	1.78 (2.71)	1.67 (2.61)	2.26 (3.17)	-0.46 (0.61)	1.75 (2.69)
25	5.82 (6.47)	1.76 (2.59)	2.00 (2.82)	2.04 (2.85)	-0.49 (0.49)	1.75 (2.59)
30	5.34 (5.95)	1.93 (2.68)	2.13 (2.87)	1.90 (2.66)	-0.45 (0.46)	1.91 (2.68)
35	5.07 (5.64)	2.15 (2.84)	2.21 (2.91)	1.81 (2.52)	-0.38 (0.49)	2.11 (2.82)
40	4.63 (5.17)	2.37 (3.02)	2.36 (3.01)	1.74 (2.42)	-0.29 (0.54)	2.32 (2.98)

Source: Devesa & Vidal (2004)
NB: Retirement age 65 and last salary equal to 100% of maximum pensionable earnings for 2002.

According to the data in Table 9, the replacement rate in all cases is increasing according to the age of retirement. However, according to the real IRR the results are not so clear. With the Swedish rules, according to the IRR, deferring retirement age is penalized more. No clear incentive exists under Italian rules either. Brazilian and Latvian regulations do give favorable treatment to deferring retirement age. Polish rules are a special case: the real IRR for men is negative due to the way the initial pension is calculated, and becomes lower and lower, while for women it is positive and practically constant. In the case of Spain, the graph line is in the shape of a hump, reaching its maximum at age 65.

Table 9: Real Internal Rate of Return (IRR) and Replacement Rate (RR) for retirement age X_j, with 35 Years Contributions (YC). Men and (women).							
X_j (YC)	**IRR RR %**	**SPAIN**	**SWEDEN**	**ITALY**	**BRAZIL**	**POLAND**	**LATVIA**
60 (35)	**IRR**	3.69 (4.22)	2.31 (2.90)	2.26 (2.86)	1.56 (2.19)	-0.26 (0.50)	2.01 (2.63)
	RR	56	38	38	31	17	34
61 (35)	**IRR**	4.06 (4.59)	2.28 (2.89)	2.21 (2.83)	1.61 (2.26)	-0.29 (0.50)	2.03 (2.67)
	RR	63	39	39	33	18	36
62 (35)	**IRR**	4.37 (4.91)	2.25 (2.88)	2.23 (2.86)	1.65 (2.32)	-0.31 (0.50)	2.05 (2.71)
	RR	71	40	40	34	19	37
63 (35)	**IRR**	4.65 (5.20)	2.21 (2.87)	2.24 (2.90)	1.70 (2.38)	-0.33 (0.49)	2.07 (2.74)
	RR	78	41	42	36	19	39
64 (35)	**IRR**	4.90 (5.45)	2.18 (2.86)	2.26 (2.93)	1.76 (2.45)	-0.36 (0.49)	2.09 (2.78)
	RR	85	42	43	38	20	40
65 (35)	**IRR**	5.07 (5.64)	2.15 (2.84)	2.21 (2.91)	1.81 (2.52)	-0.38 (0.49)	2.11 (2.82)
	RR	92	43	44	40	21	42
66 (35)	**IRR**	4.96 (5.55)	2.11 (2.83)	2.24 (2.95)	1.86 (2.59)	-0.40 (0.48)	2.13 (2.86)
	RR	92	45	46	42	22	44
67 (35)	**IRR**	4.84 (5.45)	2.08 (2.81)	2.27 (2.99)	1.92 (2.66)	-0.43 (0.48)	2.15 (2.89)
	RR	92	46	48	44	23	46
68 (35)	**IRR**	4.71 (5.34)	2.05 (2.79)	2.19 (2.93)	1.98 (2.74)	-0.45 (0.47)	2.18 (2.93)
	RR	92	48	49	47	24	48
69 (35)	**IRR**	4.58 (5.22)	2.01 (2.78)	2.14 (2.90)	2.05 (2.81)	-0.47 (0.46)	2.20 (2.97)
	RR	92	49	51	50	25	50
70 (35)	**IRR**	4.43 (5.10)	1.98 (2.76)	2.18 (2.93)	2.12 (2.89)	-0.49 (0.45)	2.23 (3.01)
	RR	92	51	53	53	26	53
Source: Devesa & Vidal (2004) **NB: Last salary equal to 100% of maximum pensionable earnings for 2002.**							

From Table 10 it can be seen that the replacement rate is once again increasing according to retirement age in all cases. If the values for the real IRR are taken as a benchmark, the results are clearer than in the case of the data from Table 9. Generally speaking, the value of the real IRR now increases with retirement age under the rules of those countries with a notional accounts system. With the rules applied in Brazil and Latvia, the favorable treatment given on deferring retirement age can be seen more clearly. Polish rules continue to give slightly decreasing negative values for men, with slightly increasing positive values for women.

Table 10: Real Internal Rate of Return (IRR) and Replacement Rate (RR) for retirement age X_j, with different numbers of Years Contributed (YC). Men and (women).							
X_j (YC)	**% IRR RR**	**SPAIN**	**SWEDEN**	**ITALY**	**BRAZIL**	**POLAND**	**LATVIA**
60 (30)	**IRR**	3.79 (4.36)	2.12 (2.76)	2.18 (2.82)	1.63 (2.30)	-0.32 (0.48)	1.82 (2.49)
	RR	50	33	33	29	16	30
61 (31)	**IRR**	4.15 (4.72)	2.12 (2.78)	2.14 (2.80)	1.66 (2.34)	-0.34 (0.48)	1.87 (2.56)
	RR	58	35	35	31	17	32
62 (32)	**IRR**	4.46 (5.02)	2.12 (2.79)	2.17 (2.83)	1.70 (2.39)	-035 (0.48)	1.93 (2.62)
	RR	66	37	37	33	18	34
63 (33)	**IRR**	4.71 (5.27)	2.13 (2.81)	2.20 (2.87)	1.73 (2.43)	-0.36 (0.48)	1.99 (2.68)
	RR	75	39	40	35	19	36
64 (34)	**IRR**	4.93 (5.49)	2.14 (2.82)	2.24 (2.92)	1.77 (2.47)	-0.37 (0.48)	2.05 (2.75)
	RR	84	41	42	37	20	39
65 (35)	**IRR**	5.07 (5.64)	2.15 (2.84)	2.21 (2.91)	1.81 (2.52)	-0.38 (0.49)	2.11 (2.82)
	RR	92	43	44	40	21	42
66 (36)	**IRR**	5.11 (5.69)	2.16 (2.86)	2.27 (2.96)	1.85 (2.57)	-0.39 (0.49)	2.17 (2.89)
	RR	92	46	47	43	22	45
67 (37)	**IRR**	5.15 (5.76)	2.18 (2.88)	2.33 (3.03)	1.89 (2.62)	-0.39 (0.50)	2.24 (2.96)
	RR	92	49	51	45	24	48
68 (38)	**IRR**	5.19 (5.82)	2.19 (2.91)	2.28 (2.99)	1.94 (2.66)	-0.39 (0.50)	2.31 (3.03)
	RR	92	52	53	48	25	52
69 (39)	**IRR**	5.23 (5.88)	2.21 (2.93)	2.27 (2.98)	1.98 (2.71)	-0.39 (0.51)	2.38 (3.10)
	RR	92	55	56	52	27	56
70 (40)	**IRR**	5.28 (5.94)	2.23 (2.95)	2.34 (3.05)	2.03 (2.76)	-0.39 (0.51)	2.45 (3.17)
	RR	92	58	60	55	28	60
Source: Devesa & Vidal (2004) NB: 30 years contributions for a retirement age of 60, increasing the number of years contributed by 1 as retirement age is deferred by 1 year. Last salary equal to 100% of maximum pensionable earnings for 2002.							

As we have just shown, the introduction in Spain of notional retirement formulas similar to those applied in some other countries would have the effect of noticeably reducing the amount of pensions currently in payment, which have been calculated using pension formulas based on traditional defined benefits. The current theoretical replacement rate for someone retiring at 65 with 35 years contributions would change from 92% to a range of values between 42% and 44%, depending on the formula chosen. In addition to this, the real theoretical IRR expected from the contributions would change from over 5.35% to less than 2.5% with any of the formulas applied. These values are in greater harmony with the real average growth of GDP in Spain over the last 40 years (3.6%), which should undoubtedly be the reference for the system to aim at in order to be financially viable in the Samuelson sense. At the same time, it could be the justification for introducing a notional accounts system in Spain.

Another positive effect of introducing this type of retirement formula in Spain could be to slow down the trend towards early retirement. The current formula, which applies decreasing weight to the years of contributions paid, is not the best example of good design in this sense.

Similarly, if the notional accounts system had been adopted, the current system would have built up extensive reserves - with the government's authorization - which, according to Alonso and Herce (2003), would enable the future “lack of manpower” to be considered more calmly.

It seems clear, therefore, that the introduction of a notional accounts system would to a great extent correct the deficiencies seen in the Spanish system. This reform should aim at achieving as far as possible the following objectives:

1) Narrow the relationship between contributions and benefits, i.e. increase the actuarial fairness of the system.

2) Carry out redistribution in the most transparent way possible.

3) Reduce the risk of political manipulation.

4) Reach a financial stability that would stand up to the demographic and economic changes that affect the system itself.

5) Mitigate or weaken the disincentive to work which is present in the current system.

6) Eliminate or minimize the actuarial deficit of the system.

It is difficult for parametric reforms to achieve the above aims. They also tend to just patch things up to keep them going long enough to be handed on to other governments and generations, since they usually involve a series of mild measures that lengthen and complicate pension calculation via countless partial, transitory arrangements.

Finally, another interesting objective - the generation of financial savings managed by the private sector - could be achieved by strengthening the complementary systems and/or rerouting part of the contributions towards a funded system, which would enable sources of retirement revenue and the risks inherent in the pension system in general to be diversified.

V.-PROPOSAL: A NEW FORMULA FOR CALCULATING RETIREMENT PENSION AND THE TRANSITION PROCESS.

If, as seen in the previous section, the introduction of a notional accounts system were being seriously considered for the beneficial effect it would have on the system as a whole by notably improving its financial viability and generating greater work incentives, one important question remains. Given that the risk is transferred explicitly to the contributors and beneficiaries, the question would be to determine the formula for calculating the pension that would best fit the degree of risk aversion of the contributor-beneficiary. The notional rates that would be used to revalue both the contributions and the pensions therefore need to be determined.

The methodology used was developed in the paper by Vidal et al. (2004) and (2005), who quantify the aggregate “economic” risk to which the beneficiary would be exposed if it were decided to introduce a retirement pension system based on notional account philosophy in Spain. For this they used scenario generation techniques to make projections of the factors determining the real expected IRR (Internal rate of return) for the beneficiary according to sixteen retirement formulas based on the RPI (Retail Price Index), the GDP (Gross Domestic Product), the Average Earnings Index (AEI), and Total Social Security Contributions Index (TSSCI). These projections are based on Herce and Alonso's macroeconomic scenario 2000-2050 (2000a) and include information about the past performance of the indexes and the time period for which the forecast is wanted.

The models used to calculate the initial retirement pension and its later variation based on the system of notional defined contribution accounts are shown in Table 11.

Table 11: Formulas for calculating the initial pension and its later variation.			
Model	**Revaluation of the contribution base**	**Notional rate for contributions**	**Notional rate for pensions**
1	RPI	GDP	RPI
2	RPI	AEI	RPI
3	RPI	GDP	RPI±GDP differential
4	RPI	GDP	RPI±AEI differential
5	RPI	AEI	RPI±GDP differential
6	RPI	AEI	RPI±AEI differential
7	RPI	TSSCI	RPI
8	RPI	TSSCI	RPI±TSSCI differential
11	AEI	GDP	RPI
12	AEI	AEI	RPI
13	AEI	GDP	RPI±GDP differential
14	AEI	GDP	RPI±AEI differential
15	AEI	AEI	RPI±GDP differential
16	AEI	AEI	RPI±AEI differential
17	AEI	TSSCI	RPI
18	AEI	TSSCI	RPI±TSSCI differential
Source: Vidal et al. (2004) RPI (Retail Price Index), the GDP (Gross Domestic Product), the Average Earnings Index (AEI), and Total Social Security Contributions Index (TSSCI)			

The results for the average expected replacement rate for each of the formulas proposed can be seen in Table 12.

Table 12: Average expected replacement rate. Retirement age 65.		
Average expected replacement rate	**Model**	**Group**
46.43%	11	1
	13	
	14	
46.39%	1	2
	3	
	4	
46.36%	12	3
	15	
	16	
46.33%	2	4
	5	
	6	
41.27%	17	5
	18	
41.24%	7	6
	8	
Source: Vidal et al. (2004)		

After forty years of contributing, the formula that provides the best replacement rate is the one for around 46.5%. This is in sharp contrast to the replacement rate currently supplied by the system, which is around 92%. If the notional accounts system were applied, in the best of

cases the initial pension would reach 51% of that obtained under the present PAYG system applying in Spain. If people started work at 20 instead of 25, these replacement rates would be slightly higher, reaching 49% in the case of group 1.

Much of this difference can be attributed to the way the current pension calculation formula is designed. If the whole working life were considered when calculating the pension base - as is advisable in contributory systems which aim at proportionality - instead of taking the last 15 years of contributions into account, then the replacement rate would have been about 75% for a person retiring at age 65 with 40 years contributions.

The results obtained for the average expected IRR are shown separately for men and women in Table 13 along with the percentage of expected deviation from the IRR for each model. Five basic aspects need to be highlighted:

1) The analysis of the average IRR shows clear differences between men and women. This discrepancy comes about because the joint average life expectancy of men and women at retirement age was used when calculating the initial pension. Given that women have a higher life expectancy, the expected return on contributions is much higher.

2) If Tables 12 and 13 are compared, no clear relation between the replacement rate and the IRR can be seen. This is because the replacement rate refers exclusively to the initial pension and, in addition, the contribution effort made is not taken into account. The IRR, however, relates all the probable inflows and outflows, and takes into account how the pension can vary over time.

Table 13: Average Internal Rate of Return (IRR) and expected deviation for men (M) and women (W). Retirement age 65.

Model	IRRM average	IRRM deviation	% DevM	IRRW average	IRRW deviation	% DevW
14	0.02492	0.01148	46.06%	0.03441	0.01192	34.64%
5	0.02491	0.01203	48.31%	0.03440	0.01364	39.65%
16	0.02490	0.01331	53.45%	0.03437	0.01372	39.90%
6	0.02489	0.0133	53.43%	0.03437	0.01349	39.26%
15	0.02489	0.01208	48.53%	0.03437	0.01234	35.92%
3	0.02488	0.01022	41.08%	0.03436	0.01065	31.00%
1	0.02486	0.00796	32.02%	0.03435	0.00823	23.94%
13	0.02485	0.01035	41.64%	0.03433	0.01057	30.79%
11	**0.02483**	**0.00791**	**31.84%**	**0.03433**	**0.00819**	**23.86%**
12	0.02482	0.00991	39.90%	0.03431	0.00997	29.07%
17	0.02111	0.01186	56.19%	0.03065	0.01169	38.14%
7	0.02101	0.01164	55.42%	0.03064	0.01166	38.04%
8	0.02097	0.01651	78.73%	0.03064	0.01682	54.89%
18	***0.02097***	***0.01651***	***78.74%***	***0.03064***	***0.01682***	***54.91%***
2	0.02046	0.00666	32.57%	0.02970	0.00667	22.47%
4	0.01926	0.00729	37.84%	0.02845	0.00755	26.56%

Source: Vidal et al. (2004)

3) There are only very small differences between the real average expected IRR for both men and women in the first ten models. This seems to indicate that the participant-beneficiary could choose any of these models using his or her degree of risk aversion as a basis for making the decision.

4) The values obtained for the real IRR appear to be surprisingly low, but in fact they are not that low as the calculation is being considered *a priori*. The values will increase proportionally as the contributor is assumed to grow older. With similar assumptions, and assuming current Spanish legislation constant for the whole time period considered, the real IRR would be 4.05% and 4.93% for men and women respectively. However, it would be best to qualify the above figures since the value of the IRR in the defined benefit PAYG system does not include possible future reductions in its value because it is calculated in a system in which financial equilibrium is presupposed. Future pensioners will probably have to make greater contributions (through tax increases) and/or receive smaller pensions. In other words, if the defined benefit system intends to respect its acquired commitments to members, it must be because available financial resources exist to cover the system's future deficit. If these funds were used in the notional accounts system, this would provide a larger pension, thereby reducing the IRR differential.

5) The average values undergo deviations, which imply that those models that generate a greater deviation of the IRR relative to the average IRR are riskier. The listing in order of deviation is the same for men and women as they depend on the same volatility factors. Model 18 shows the highest risk in terms of typical deviation, while Model 11 has the least. In general terms, IRR deviation for women is greater than for men.

To summarize, it can be concluded from what has just been set out that:

1) The *a priori* average expected IRR for both men and women, following any of the formulas tested based on representative indices of relevant macroeconomic variables, is quite clearly lower than the IRR awarded today on contributory retirement pensions by current Spanish legislation. The envisaged replacement rate in the most favourable formula barely reaches 50.5% of that obtained today. This only goes to highlight the profound structural actuarial imbalance present in the current configuration of the defined benefit retirement pension system in Spain.

2) The preferred models for both male and female beneficiaries who are neutral to risk are 14 and 5, in descending order. The first of these capitalizes the contributions in line with the expected evolution of the GDP; the second follows the AEI. In both cases the pensions can participate in the probable upward fluctuations of the salaries index above that foreseen.

3) Some contributor-beneficiaries with a different risk profile may prefer retirement formulas different to those in the paragraph above. It would not be impossible to provide a certain degree of freedom of choice as regards the preferred formula according to the contributor's perception of risk and the evolution and forecast pathway of the indices. Involving the individual in taking decisions as to the model he considers most suitable will make him feel much more committed to the NDC system. Nevertheless, this choice on the part of the beneficiary would have to be subject to the financial sustainability of the system in the Samuelson sense.

The process of transition from the current system to one of notional accounts should not pose any problems since the Spanish Social Security system has a reliable computerized register of each contributor's employment history. Thus, in order to respect the acquired rights of those who are close to retirement age, it could be established that the changeover to the new system should be carried out in such a way that pensions be calculated taking both systems into

account using coefficients that would depend on date of birth, in a similar way to how it is done in Sweden.

The notional accounts model suggested for Spain should incorporate additional control elements for the solvency of the system as a whole. These could include, for example, a maximum annual level of deficit as a percentage of the GDP or a maximum accumulated level of deficit over five years, also as a percentage of the GDP. And so that contributors and initial pensions do not bear the brunt of the adjustment effort, pensions already in payment could be reviewed periodically to take into account any possible changes in mortality rates. Any of the formulas put forward in this section would be acceptable and could be chosen by the contributor as long as applying them brought about an annual or accumulated deficit below the level eventually set by law. A stabilizing mechanism could also be incorporated similar to that established in Sweden, Settegren (2001). However, as we point out in our conclusions further on, more research would need to be done into this matter.

Following Holzmann (2005), in order to achieve a better coordinated pension system in an integrated Europe, and making the most of the fact that Spain already has a non-contributory pillar, this should be transformed into a zero pillar of social or non-contributory pensions providing minimum income support for the vulnerable elderly. Eligibility for the non-contributory pension will naturally be means-tested, but in a more demanding and rigorous way than is done at present in Spain.

Similarly with the contributory pillar, a means-tested guaranteed minimum pension should also be maintained, with the complement to bring it up to minimum levels being financed through taxation. Accurately setting the relation between the amount of the minimum pension and the pension the zero pillar could provide would be of the utmost importance. The possibility of contributors having a free choice as to the age they retire could bring about an excessive number of early retirements which, in turn, could put pressure on the authorities to increase the amount of the guaranteed minimum pension. Palmer (2001) shows that there is empirical evidence that people tend to retire as soon as they are allowed to, and so it should not be made possible for early retirement to be decided freely. One of the main problems of the Spanish pension system is that the real average retirement age is around 62 years. This is due to permissive legislation which in many cases allows early retirement. The possibility of early retirement should be eliminated. At first the minimum retirement age should be maintained at 65 as long as enough has been accumulated in the notional account to give entitlement to the minimum pension, otherwise the person will have to continue working until age 70.

Alonso & Herce (2003) - see Table 5 for their main forecasts - state that the contributory pension system will go into deficit from the year 2020, and therefore around then would be the best time for the notional accounts system to be fully in place.

Despite being technically possible, the process of introducing the notional accounts system in Spain could not be immediate mainly because it would be unviable from the political point of view today. As mentioned above, neither the previous government nor the current one in power since the general elections of 14 March 2004 consider any but parametric reforms. Increasing the way the pension base is calculated to cover the whole of working life, which almost all political parties think is a good idea, has been under discussion for over two years and is still far from being agreed. In addition to this, the way notional accounts work is unknown to both politicians and the main opinion makers in Spain.

A less radical proposal, but one which could be politically possible, would be the one shown in Table 14, more in line with the transition process followed in Italy and Sweden than that in Latvia. The transition suggested would mean both systems functioning side by side over a 20-year period, after which the notional accounts system would take over completely. This should be accompanied by a change in the way the amount of pension is calculated so as to increase the pension base to cover the whole of the individual's working life and eliminate the possibility of retiring before age 65. Combining both systems would imply an improvement on the forecasts made by Alonso & Herce (2003), deferring the expected deficit and increasing the system's solvency for a time horizon of 20 years.

Table 14: Timetable for adapting to pension reform in Spain.		
Year of retirement	**Pension received from the notional accounts system %**	**Pension received from the current system[18] %**
2005	0	100
2006	5	95
.....	.....	.....
2023	90	10
2024	95	5
2025	100	0
Source: own		

Various modifications could be made to the basic proposal above depending on the degree of political acceptance, which in Spain would be a rather thorny issue:

1.-Extend the transition period to 40 years, for example, in which case the change in the amounts of pension would be much more gradual. As a consequence, however, the benefits of the change would be seen only gradually too.

2.-Calculate the retirement pension following notional philosophy, but take into account acquired rights when calculating the initial notional capital.

VI.-CONCLUSIONS AND FUTURE RESEARCH.

In the light of all the arguments looked at in the previous sections along with the research papers referred to, it seems clear that the main conclusion is that there is a need to carry out some kind of far-reaching reform of the contributory pension system in Spain.

The discussion should therefore revolve around the type of reform to be applied rather than whether its introduction should be recommended.

A reform option in the shape of a notional accounts system applying to all the various systems of the Spanish contributory system as a whole (including the Special System for Civil Servants) could enable the six objectives mentioned in section IV to be achieved. This reform would mean a reduction in the amount of pensions and IRR, but it would have the effect of giving the system greater credibility and greater long-term financial equilibrium, thereby avoiding constant piecemeal reforms. The objective of generating financial savings managed by the private sector could be achieved by strengthening the complementary systems and/or rerouting part of the contributions towards a funded system which would enable sources of retirement revenue and the risks inherent in the pension system in general to be diversified.

[18] The number of years taken into account to calculate the pension base would start increasing by one year from 2005.

Given that the risk is transferred explicitly to the contributor-beneficiary, great care would have to be taken over the design of the actual formula for calculating retirement pension. As was seen in the previous section, if contributor-beneficiaries who are neutral to risk are to be rewarded, contributions should be capitalized in line with the evolution of the GDP or the AEI. Pensions could participate in the upward fluctuations above the rate forecast of the index of variation in salaries. On the other hand, if the design of the formula were to reward contributor-beneficiaries who are more averse to risk, then the formula would be similar as regards contributions, but pensions would simply be adjusted in line with the RPI.

In response to one of the criticisms that are usually made against notional account systems - that contributors take on the risk of the evolution of the index and are subject to a risk-return trade-off they have not chosen, i.e. their aversion to risk is not taken into account like it is in private capitalization funds - it would be best if there were a menu of retirement formulas available, such as those put forward in the previous section, and that contributors could change the index used to capitalize their contributions every so often (every three or five years, for example) according to their perception of risk and the evolution and anticipated pathway of the indices. Involving the individual in taking decisions as to the model he considers most suitable will make him feel much more committed to the NDC system. This does not mean that there are no mechanisms to safeguard the financial equilibrium of the system in case of economic and/or demographic shocks. In practice, as mentioned above, some countries have mechanisms to stabilize the system in case serious financial imbalances appear.

Finally, bearing in mind that this is the first proposal for introducing a notional accounts system in Spain and given the special features of the current pension system and the country's idiosyncrasies, at least three aspects need to be researched more deeply and carefully:

1) In order to evaluate more precisely the impact that introducing a notional accounts system could have on current contributors, there would be a need for a sufficiently wide representative sample of their real wage histories (and contribution bases). An analysis of this information could also be very useful for deciding how to carry out the definitive proposal for harmonizing the different occupational schemes.

2) The proposed measures for financial stability in case of short-term financial imbalances should be more precisely defined.

3) Spanish public opinion, social agents, politicians, and even economists and actuaries are unaware of how notional accounts work. So as to test the political viability of the reform, an opinion poll would need to be carried out to find out how acceptable the first proposal made in this paper would be.

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